A Golden Opportunity for Better Health

Mine tailings contaminate the Puyango River, endangering aquatic life and human health. (FUNSAD Photo: N. Mainville)

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“Mining goes back a long way. We are the children of miners. Our grandparents were miners as well... We are surrounded by contamination. But we have been a little bit blind — this is the first time in the history of this town that there has been an environmental group to help solve this problem. Maybe we are a little bit late, but at least we have it now.”

These are the words of Alexandra Jaramillo, who works for a municipal authority formed to deal with the manifold environmental and health problems spawned by small-scale mining in the Ecuadorian towns of Zaruma and Portovelo.

Mining in Zaruma and Portovelo

The hills of Zaruma and Portovelo have been mined for gold and silver for centuries — the Incas were producing gold in the area when the Spanish founded the town of Zaruma in 1549. However, the extraction of gold went into high gear when an American mining company, the Southern American Development Company (Sadco), gained control of the main gold deposits in the district in 1897. In the 53 years that followed, Sadco recovered some 3.5 million ounces of gold and 17 million ounces of silver from 8 million tons of ore. In 1984, the old Sadco pits were invaded by poverty-stricken miners, and small-scale and artisanal mining has been going on every since.

The mines are unsafe, poorly ventilated, and hot — and there is the constant threat of cave-ins. Using simple tools and equipment, men and boys as young as 12 spend long hours doing the backbreaking work of dislodging ore laced in finger-like ribbons with the pale colour of gold. They often work with their family members, or in informal groups, splitting the profits from whatever gold they find. It’s a hit and miss business — some months they don’t find enough to break even.

A toxic process

While mining is hazardous, the processing of gold can be toxic. Miners frequently separate the gold from the ore themselves, using the age-old process of mercury amalgamation. This is inexpensive, effective — but so dangerous to health and the environment that it has been banned in many countries throughout the world.

After the ore is crushed and sifted, it is combined with mercury, which bonds with the gold to form a dense amalgam or “cake.” Miners then heat this cake to burn off the mercury, leaving behind a gold nugget. Mercury in this form is so toxic that the amalgamation process is dangerous not just for those processing the gold, but for everyone in the vicinity. Chronic exposure to mercury is known to lead to neurological disorders that include blurred vision, tremors, malaise, memory loss, and intellectual impairment.

But this information is not necessarily well known, explains Jaramillo. “Gold getting processed is seen as such a natural activity. I have seen little children playing with mercury.” She adds, “Grandparents don’t believe in changing the way things have been done. They have the opinion that precautions are not necessary.”

The impact of heavy metal contamination

Increasingly, miners bring their sacks of raw gold to processing plants where gold is extracted using a more efficient, mechanized process. However, this process leaves behind a muddy sludge of tailings containing a mix of lead, mercury, manganese, and various cyanides. These tailings are eventually flushed into the river system, poisoning the water and killing all aquatic life in the area.

Not only does this contamination affect the health of people living in the immediate area, it is causing harm to subsistence farmers living in remote communities near the Peruvian border. These are among the findings of a small, Ecuadorian nongovernmental organization known as Fundacion Salud Ambiente y Desarrollo (FUNSAD).

With support from the International Development Research Centre (IDRC), FUNSAD’s researchers studied pollution caused by heavy metals and cyanides originating from the gold refining process, examined the impact these contaminates were having on human health, and made links to socio-economic and cultural conditions that influence how people interact with their environment. Communities at three different points along the Puyango river system were studied.

A transdisciplinary approach

The research team — which comprised three medical doctors, two geologists, a sociologist, and a community development worker — aimed to help unravel the complexity of the problems facing riverside communities by taking a transdisciplinary approach. They did research on three fronts. They tested the environment for the presence of mercury, lead, manganese, and cyanide; examined people’s health for signs of over-exposure to heavy metals and cyanide; and collected social, economic, and other data on the ways people used the environment.

The survey was particularly critical for filling out researchers’ understanding of precisely how and why people’s health was being affected by environmental contamination. Were people drinking water straight from the river? Did they know about the risks of burning mercury amalgam? Were women and men exposed to contamination in the same way or to the same extent? By uncovering answers to these sorts of questions, the researchers aimed to lay the groundwork for finding concrete ways to make lasting improvements in human health.

Three ecosystems studied

The research team tested river water, solids in suspension, and river sediment, as well as examining fish and other food sources. They expected to find the water and food contaminated primarily with mercury — and, in fact, mercury was present in the water, particularly near the processing plants. However, says Betancourt, “the surprising result was that the water was most

contaminated with lead." Measurements taken at the processing plants were extremely high and downstream the concentrations of lead were 16 times higher than at the river's origins.

To understand the extent to which this was affecting people's health, researchers used a range of medical procedures. They did clinical exams; tested blood, urine, and hair samples; and administered a battery of neurobehavioural tests. These quick and straightforward tests check for the subtle signs of chronic exposure to heavy metals — symptoms related to coordination and cognition that can be easy to overlook.

Key among FUNSAD's findings was that people in the lower basin communities and in Zaruma and Portovelo had elevated levels of lead in their bodies. People living near the bottom of the river were also showing unsettling signs of neurobehavioural problems related to fine motor skills, attention, and memory. [See related sidebar: Health Effects of Lead Exposure]

Looking for answers

The questionnaire the team administered helped illuminate why this was happening. Researchers gathered a broad range of information about how people lived and worked, the ways they used the river, and their viewpoints on contamination, prevention, and protection.

Results revealed that, particularly during the dry season, people in the river's lower zone relied heavily on the river. As Betancourt explains: "The people living downstream drink the water from the river all the time without any treatment. And they eat the fish — it is their main food because it has no cost." He adds that people also believed that the fast-running water of the river meant that they would be protected from any pollution.

In Portovelo and Zaruma, by contrast, people knew the river was contaminated — they could see it was lifeless. They didn't drink untreated water or rely on the river for food. Yet FUNSAD's research revealed that most people in the area had dangerous levels of lead in their bloodstream. The research team plans to investigate the possible causes of this finding in their second phase of research.

Forging links with local government

Research results were brought to the attention of the local authorities in both Zaruma and Portovelo. A new municipal environmental group has consequently been formed — a joint effort between the communities of Zaruma and Portovelo. In addition to educating the population about risks related to contamination caused by mining, the group will also devise a new regional environmental code that will be enforced by municipalities.

"We want to finish with the contamination once and for all," says Jaramillo. "But if we can't do it 100 percent, then at least we can do something to make things better."

As the mayor of Portovelo, Segundo Orellana, says, "We know the degree of contamination that exists in the watershed. I think we can succeed in finding solutions that will benefit the community. We have to start increasing our effort because the alternative is more contamination — and the impact that this could have on us all."

Lisa Waldick is the Editor of Reports magazine.

For more information:

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Sidebar

Health Effects of Lead Exposure

A human body cannot tell the difference between lead and calcium, which means that lead is absorbed into the bones where it can collect for a lifetime. Chronic effects are often attributed to low exposures cumulating over a long period of time. Symptoms include excessive tiredness, nervous irritability, fine tremors, and numbness. Because these symptoms are common to a variety of health problems, they can easily be overlooked.

Moreover, children ages 6 and younger face special hazards. Because their bodies are developing rapidly, even exposure to low levels of lead can have permanent effects including nervous system and kidney damage, decreased muscle, and bone growth. It has also been shown that overexposure to lead can harm the intellectual performance of children causing learning disabilities and decreased intelligence.